of nitric acid may be used to 4 parts by weight of boiling water as a substitute.

GOLD PURPLE.

I.—The solution of stannous chloride necessary for the preparation of gold purple is produced by dissolving pure tin in pure hydrochloric acid (free from iron), in such a manner that some of the tin remains undissolved, and evaporating the solution, into which a piece of tin is laid, to crystallization.

II.—Recipe for Pale Purple.—Dissolve 2 parts by weight of tin in boiling aqua regia, evaporate the solution at a moderate heat until it becomes solid, dissolve in distilled water and add 2 parts by weight of a solution of stannous chloride (specific gravity 1.7) dilute with 9,856 parts by weight of water, stir into the liquid a solution of gold chloride prepared from 0.5 parts by weight of gold and containing no excess of acid (the latter being brought about by evaporating the solution of gold chloride to dryness and heating for some time to about 320° F.). This liquid is dimmed by the admixture of 50 parts by weight of liquid ammonia which eliminates the purple. The latter is quickly filtered off, washed out and while still moist rubbed up with the glass paste. This consists of enamel of lead 20 parts by weight; quartzose sand, 1 part by weight; red lead, 2 parts by weight; and calcined borax, 1 part by weight, with silver carbonate, 3 parts by weight.

III.—Recipe for Dark Gold Purple.—Gold solution of 0.5 parts by weight of gold, solution of stannous chloride (specific gravity 1.7) 7.5 parts by weight; thin with 9,856 parts by weight of water, separate the purple by a few drops of sulphuric acid, wash out the purple and mix same with enamel of lead 10 parts by weight and silver carbonate, 0.5 parts by weight.

IV.—Recipe for Pink Purple.—Gold solution of 1 part by weight of gold; solution of 50 parts by weight of alum in 19,712 parts by weight of water; add 1.5 parts by weight of stannous chloride solution (specific gravity 1.7) and enough ammonia until no more precipitate is formed; mix the washed out precipitate, while still moist, with 70 parts by weight of enamel of lead and 2.5 parts by weight of silver carbonate. According to the composition of the purple various reds are obtained in fusing it on; the latter may still be brightened up by a suitable increase of the flux.

To Render Pale Gold Darker.—Take verdigris, 50 parts by weight and very strong vinegar, 100 parts by weight. Dissolve the verdigris in the vinegar, rub the pieces with it well, heat them and dip them in liquid ammonia diluted with water. Repeat the operation if the desired shade does not appear the first time. Rinse with clean water and dry.

To Color Gold.—Gilt objects are improved by boiling in the following solution: Saltpeter, 2 parts by weight; cooking salt, 1 part by weight: alum, 1 part by weight; water, 24 parts by weight; hydrochloric acid, 1 part by weight (1.12 specific gravity). In order to impart a rich appearance to gilt articles, the following paste is applied: Alum, 3 parts by weight; saltpeter, 2 parts by weight; zinc vitriol, 1 part by weight; cooking salt, 1 part by weight; made into a paste with water. Next, heat until black, on a hot iron plate, wash with water, scratch with vinegar and dry after washing.

Gold-Leaf Striping.—To secure a good job of gilding depends largely for its beauty upon the sizing. Take tube chrome yellow ground in oil, thin with wearing body varnish, and temper it ready for use with turpentine. Apply in the evening with an ox-tail striper, and let it stand until the next morning, when, under ordinary circumstances, it will be ready for the gold leaf, etc. After the gilding is done, let the job stand 24 hours before varnishing.

Composition of Aqua Fortis for the Touch-Stone.—Following are the three compositions mostly in use: I.—Nitric acid, 30 parts; hydrochloric acid, 3 parts; distilled water, 20 parts.

II.—Nitric acid, 980 parts by weight; hydrochloric acid, 20 parts by weight.

III.—Nitric acid, 123 parts by weight; hydrochloric acid, 2 parts by weight.

To Remove Soft Solder from Gold.—Place the work in spirits of salts (hydrochloric acid) or remove as much as possible with the scraper, using a gentle heat to remove the solder more easily.

Tipping Gold Pens.—Gold pens are usually tipped with iridium. This is done by soldering very small pieces to the points and filing to the proper shape.

To Recognize Whether an Article is Gilt.—Simply touch the object with a glass rod previously dipped into a solution of bichloride of copper. If the article has been gilt the spot touched should remain intact, while it presents a

brown stain if no gold has been deposited on its surface.

To Burnish Gilt Work.—Ale has proved a very good substitute for soap and water in burnishing gilt as it increases the ease and smoothness with which it is accomplished. Vinegar is a somewhat poorer substitute for ale.

White-Gold Plates Without Solder.—The gold serving as a background for white-gold is rolled in the desired dimensions and then made perfectly even under a powerful press. It is then carefully treated with a file until a perfectly smooth surface is obtained. After a white-gold plate of the required thickness has been produced in the same manner, the surfaces of the two plates to be united are coated with borax and then pressed together by machine, which causes the harder metal to be squeezed slightly into the surface of the other, furnishing a more solid and compact mass. The metals, now partially united, are firmly fastened together by means of strong iron wire and a little more borax solution is put on the edges. Then heat to the temperature necessary for a complete adhesion, but the heat must not be so great as to cause an alloyage by fusing. The whole is finally rolled out into the required thickness.

To Fuse Gold Dust.—Use such a crucible as is generally used for melting brass; heat very hot; then add the gold dust mixed with powdered borax; after some time a scum or slag will be on top, which may be thickened by the addition of a little lime or bone ash. If the dust contains any of the more oxidizable metals, add a little niter, and skim off the slag or scum very carefully; when melted, grasp the crucible with strong iron tongs, and pour off immediately into molds, slightly greased. The slag and crucibles may be afterwards pulverized, and the auriferous matter recovered from the mass through cupellation by means of lead.

GOLD ALLOYS:

See Alloys.

GOLD, SILVER OR COPPER EMBOSSING INK:

Take glycerine, 5 parts; silicate of soda (water glass), 2 parts; water, 8 parts; Carter's Red Sunset ink, or other ink, enough to color. Or most any aniline dye, water soluble, will dissolve in the solution. The coloring is only to guide the pen when writing. The glycerine and silicate keep the writing moist and tacky so that it will retain the gold or silver powder dusted on. Thin writing produces the best results. Dust the gold or other powder on the writing and flick off the surplus powder with the finger, from the back of the paper. An electric iron (as used for ironing clothes) is the best thing to heat the writing and bring out the embossed effect. Have the iron hot, but not too hot or it will burn the paper and spoil the embossing powder. Turn the switch off when iron is hot enough and on again as needed, if you are doing considerable work. Experience will guide you in the amount of heat necessary. Hold the back of the paper upon which the embossing is to appear, over the iron, pressing down lightly with some metallic object like a table knife, or fork or a nail file. As soon as the writing or imprinting raises, remove from heat. The raised letters will be smooth and stand up when the work is correctly done. After the work has cooled off, wipe off any surplus powder with a clean rag. Shake before using. Write with clean pen. While writing is still wet dust the powder over it. Then heat gently over an electric or gas toaster, or iron, until embossing effect is obtained.

GRAIN.

Formalin Treatment of Seed Grain for Smut.—Smut is a parasitic fungus, and springs from a spore (which corresponds to a seed in higher plants). This germinates when the grain is seeded and, penetrating the little grain plant when but a few days old, grows up within the grain stem. After entering the stem there is no evidence of its presence until the grain begins to head. At this time the smut plant robs the developing kernels of their nourishment and ripens a mass of smut spores.

These spores usually ripen before the grain, and are blown about the field, many spores becoming lodged on the ripening grain kernels. The wholesale agent of infection is the threshing machine. For this reason the safest plan is to treat all seed wheat and oats each year.

Secure a 40 per cent solution of formalin (the commercial name for formaldehyde gas held in a water solution). About 1 ounce is required for every 5 bushels of grain to be treated.

Clean off a space on the barn floor or sweep a clean space on the hard level ground and lay a good-sized canvas down, on which to spread out the wheat. See that the place where the grain is to be treated is swept clean and thoroughly sprinkled with the formalin solution before placing the seed grain there.

Prepare the formalin solution immediately before use, as it is volatile, and if kept may disappear by evaporation.

Use 4 ounces of formalin for 10 gallons of water. This is sufficient for 600 pounds of grain. Put the solution in a barrel or tub, thoroughly mixing.

The solution can be applied with the garden sprinkler. Care must be taken to moisten the grain thoroughly. Sprinkle, stir the grain up thoroughly and sprinkle again, until every kernel is wet.

After sprinkling, place the grain in a conical pile and cover with horse-blankets, gunny sacks, etc. The smut that does the damage lies just under the glume of the oats or on the basal hairs of the wheat. Covering the treated grain holds the gas from the formalin *within* the pile, where it comes in contact with the kernels, killing such smut spores as may have survived the previous treatment. After the grain has remained in a covered pile 2 to 4 hours, spread it out again where the wind can blow over it, to air and dry.

As soon as the grain can be taken in the hand without the kernels sticking together, it can be sown in the field. The grain may be treated in the forenoon and seeded in the afternoon.

Since this treatment swells the kernels it hastens germination and should be done in the spring just before seeding time.

While the copper sulphate or bluestone treatment is valuable in killing smut, the formalin treatment can be given in less time, is applied so easily and is so effectual that it is recommended as a sure and ready means of killing smut in wheat and oats.

GRAPE JUICE:

This recipe has an excellent flavor and a good color. Place 1 pint of grapes, picked from the stem, in a hot sterilized quart jar. Add one cupful of sugar and fill with boiling water. Seal and turn upside-down overnight. In the morning turn right side up. This aids in dissolving the sugar. Store in a cool dark place.

GRAPE JUICE, PRESERVATION OF:

See Wines and Liquors.

GRAPHITE AS A LUBRICANT:

See Lubricants.

GRAVEL WALKS.

For cleaning gravel walks any of the following may be used: I.—Gas-tar liquor.

II.—Rock salt (cattle salt).

III.—Hydrochloric acid.

IV.—Sulphuric acid.

V.—Fresh limewater. The gas-tar liquor must be poured out a few times in succession, and must not touch the tree roots and borders of the paths. This medium is cheap. Cattle salt must likewise be thrown out repeatedly. The use of hydrochloric and sulphuric acids is somewhat expensive. Mix 60 parts of water with 10 parts of unslaked lime and 1 part of sulphuric acid in a kettle, and sprinkle the hot or cold mixture on the walks by means of a watering pot. If limewater is used alone it must be fresh —1 part of unslaked lime in 10 parts of water.

GRAVERS:

To Prepare Gravers for Bright-Cutting.—Set the gravers after the sharpening on the oilstone on high-grade emery (tripoli) paper. Next, hone them further on the rouge leather, but without tearing threads from it. In this manner the silver and aluminum engravers grind their gravers. A subsequent whetting of the graver on the touchstone is not advisable, since it is too easily injured thereby. A graver prepared as described gives excellent bright engraving and never fails.

In all bright-cutting the graver must be highly polished; but when bright-cutting aluminum a lubricant like coal-oil or vaseline is generally employed with the polished tool; a mixture of vaseline and benzine is also used for this purpose. Another formula which may be recommended for bright-cutting aluminum is composed of the following ingredients: Mix 4 parts of oil of turpentine and 1 part of rum with 1 ounce of stearine. Immerse the graver in any of the mixtures before making the bright-cut.

GREASES:

See Lubricants.

GREASE ERADICATORS:

See Cleaning Preparations and Methods.

GREASE PAINTS:
See Cosmetics.

GREEN, TO DISTINGUISH BLUE FROM, AT NIGHT:
See Blue.

GREEN GILDING:
See Plating.

GRENADES:
See Fire Extinguishers.

GRINDING:
See Tool Setting.

GRINDER DISK CEMENT, SUBSTITUTE FOR:
See Adhesives.

GRINDSTONES:

To Mend Grindstones.—The mending of defective places in grindstones is best done with a mass consisting of earth-wax (so-called stone-pitch), 5 parts, by weight; tar, 1 part; and powdered sandstone or cement, 3 parts, which is heated to the boiling point and well stirred together. Before pouring in the mass the places to be mended must be heated by laying red-hot pieces of iron on them. The substance is, in a tough state, poured into the hollows of the stone, and the pouring must be continued, when it commences to solidify, until even with the surface.

Treatment of the Grindstone.—The stone should not be left with the lower part in the water. This will render it brittle at this spot, causing it to wear off more quickly and thus lose its circularity. It is best to moisten the stone only when in use, drop by drop from a vessel fixed above it and to keep it quite dry otherwise. If the stone is no longer round, it should be made so again by turning by means of a piece of gas pipe or careful trimming, otherwise it will commence to jump, thus becoming useless. It is important to clean all tools and articles before grinding, carefully removing all grease, fat, etc., as the pores of the stone become clogged with these impurities, which destroy its grain and diminish its strength. Should one side of the grindstone be lighter, this irregularity can be equalized by affixing pieces of lead, so as to obtain a uniform motion of the stone. It is essential that the stone should be firm on the axis and not move to and fro in the bearings.

Grindstone Oil.—Complaints are often heard that grindstones are occasionally harder on one side than the other, the softer parts wearing away in hollows, which render grinding difficult, and soon make the stone useless. This defect can be remedied completely by means of boiled linseed oil. When the stone is thoroughly dry, the soft side is turned uppermost, and brushed over with boiled oil, which sinks into the stone, until the latter is saturated. The operation takes about 3 to 4 hours in summer. As soon as the oil has dried, the stone may be damped, and used without any further delay. Unlike other similar remedies, this one does not prevent the stone from biting properly in the oiled parts, and the life of the stone is considerably lengthened, since it does not have to be dressed so often.

GROUNDS FOR GRAINING COLORS:
See Pigments.

GUMS:

(See also Adhesives, under Mucilages.)

Gums, their Solubility in Alcohol.—The following table shows the great range of solubility of the various gums, and of various specimens of the same gum, in 60 per cent alcohol:

Acajon	6.94 to 42.92
Aden	0.60 to 26.90
Egyptian	46.34
Yellow Amrad	26.90 to 32.16
White Amrad	0.54 to 1.50
Kordofan	1.40 to 6.06
Australian	10.67 to 20.85
Bombay	22.06 to 46.14
Cape	1.67 to 1.88
Embavi	25.92
Gedda	1.24 to 1.30
Ghatti	31.60 to 70.32
Ghezereh	1.50 to 12.16
Halebi	3.70 to 22.60
La Plata	9.65
Mogadore	27.66
East Indian	3.24 to 74.84
Persian	1.74 to 17.34
Senegal	0.56 to 14.30

Substitute for Gum Arabic.—Dissolve 250 parts of glue in 1,000 parts of boiling water and heat this glue solution on the water bath with a mixture of about 10 parts of barium peroxide of 75 per cent BaO_2 and 5 parts of sulphuric acid (66°) mixed with 115 parts of water, for about 24 hours. After the time has elapsed, pour off from the barium sulphate, whereby a little sulphurous acid results owing to reduction of the sulphuric acid, which has a bleaching action and makes the glue somewhat paler. If this solution is mixed, with stirring, and dried upon glass plates in the drying-room, a product which can hardly be

distinguished from gum arabic is obtained. An envelope sealed with this mucilage cannot be opened by moistening the envelope. The traces of free acid which it contains prevent the invasion of bacteria, hence all putrefaction.

The adhesive power of the artificial gum is so enormous that the use of cork stoppers is quite excluded, since they crumble off every time the bottle is opened, so that finally a perfect wreath around the inner neck of the bottle is formed. Only metallic or porcelain stoppers should be used.

GUM ARABIC, INCREASING ADHESION OF:
See Adhesives, under Mucilages.

GUM BICHROMATE PROCESS:
See Photography.

GUM DROPS:
See Confectionery.

GUM-LAC:
See Oil.

GUMS USED IN MAKING VARNISH:
See Varnishes.

GUN BARRELS, TO BLUE:
See Steel.

GUN BRONZE:
See Alloys, under Phosphor Bronze.

GUN COTTON:
See Explosives.

GUN LUBRICANTS:
See Lubricants.

GUNPOWDER:
See Explosives.

GUNPOWDER STAINS.

A stain produced by the embedding of grains of gunpowder in the skin is practically the same thing as a tattoo mark. The charcoal of the gunpowder remains unaffected by the fluids of the tissues, and no way is known of bringing it into solution there. The only method of obliterating such marks is to take away with them the skin in which they are embedded. This has been accomplished by the application of an electric current, and by the use of caustics. When the destruction of the true skin has been accomplished, it becomes a foreign body, and if the destruction has extended to a sufficient depth, the other foreign body, the coloring matter which has been tattooed in, may be expected to be cast off with it.

Recently pepsin and papain have been proposed as applications to remove the cuticle. A glycerole of either is tattooed into the skin over the disfigured part; and it is said that the operation has proved successful.

It is scarcely necessary to say that suppuration is likely to follow such treatment, and that there is risk of scarring. In view of this it becomes apparent that any such operation should be undertaken only by a surgeon skilled in dermatological practice. An amateur might not only cause the patient suffering without success in removal, but add another disfigurement to the tattooing.

Carbolic acid has been applied to small portions of the affected area at a time, with the result that the powder and skin were removed simultaneously and, according to the physician reporting the case, with little discomfort to the patient.

Rubbing the affected part with moistened ammonium chloride once or twice a day has been reported as a slow but sure cure.

GUTTA-PERCHA.

Gutta-Percha Substitute.—I.—A decoction of birch bark is first prepared, the external bark by preference, being evaporated. The thick, black residue hardens on exposure to the air, and is said to possess the properties of gutta-percha without developing any cracks. It can be mixed with 50 per cent of India rubber or gutta-percha. The compound is said to be cheap, and a good non-conductor of electricity. Whether it possesses all the good qualities of gutta-percha is not known.

II.—A new method of making gutta-percha consists of caoutchouc and a rosin soap, the latter compounded of 100 parts of rosin, 100 parts of Carnauba wax, and 40 parts of gas-tar, melted together and passed through a sieve. They are heated to about 355° to 340° F., and slowly saponified by stirring with 75 parts of limewater of specific gravity 1.06. The product is next put into a kneading machine along with an equal quantity of caoutchouc cuttings, and worked in this machine at a temperature of 195° F. or over. When sufficiently kneaded, the mass can be rolled to render it more uniform.

GUTTER CEMENT:
See Cement and Putty.

GYPSUM:
See also Plaster.

Method of Hardening Gypsum and Rendering it Weather-Proof.—Gypsum possesses only a moderate degree of strength even after complete hardening,

and pieces are very liable to be broken off. Various methods have been tried, with a view to removing this defect and increasing the hardness of gypsum. Of these methods, that of Wachsmuth, for hardening articles made of gypsum and rendering them weather-proof, deserves special notice. All methods of hardening articles made of gypsum have this in common: the gypsum is first deprived of its moisture, and then immersed in a solution of certain salts, such as alum, green vitriol, etc. Articles treated by the methods hitherto in vogue certainly acquire considerable hardness, but are no more capable of resistance to the effects of water than crude gypsum. The object of Wachsmuth's process is not merely to harden the gypsum, but to transform it on the surface into insoluble combinations. The process is as follows: The article is first put into the required shape by mechanical means, and then deprived of its moisture by heating to 212° to 302° F. It is then plunged into a heated solution of barium hydrate, in which it is allowed to remain for a longer or shorter time, according to its strength. When this part of the process is complete, the article is smoothed by grinding, etc., and then placed in a solution of about 10 per cent of oxalic acid in water. In a few hours it is taken out, dried, and polished. It then possesses a hardness surpassing that of marble, and is impervious to the action of water. Nor does the polish sustain any injury from contact with water, whereas gypsum articles hardened by the usual methods lose their polish after a few minutes' immersion in water. Articles treated by the method described have the natural color of gypsum, but it is possible to add a color to the gypsum during the hardening process. This is done by plunging the gypsum, after it has been deprived of its moisture, and before the treatment with the barium solution, into a solution of a colored metallic sulphate, such as iron, copper, or chrome sulphate, or into a solution of some coloring matter. Pigments soluble in the barium or oxalic-acid solutions may also be added to the latter.

Gypsum may be hardened and rendered insoluble by ammonium borate as follows: Dissolve boric acid in hot water and add sufficient ammonia water to the solution that the borate at first separated is redissolved. The gypsum to be cast is stirred in with this liquid, and the mass treated in the ordinary way. Articles already cast are simply washed with the liquid, which is quickly absorbed. The articles withstand the weather as well as though they were of stone.

GYPSUM FLOWERS:
See Flowers.

GYPSUM, PAINT FOR:
See Paint.

HAIR FOR MOUNTING.

The microscopist or amateur, who shaves himself, need never resort to the trouble of embedding and cutting hairs in the microtome in order to secure very thin sections of the hair of the face. If he will first shave himself closely "with the hair," as the barbers say (i. e., in the direction of the natural growth of the hair), and afterwards lightly "against the hair" (in the opposite direction to above), he will find in the "scrapings" a multitude of exceedingly thin sections. The technique is very simple. The lather and "scrapings" are put into a saucer or large watch-glass and carefully washed with clean water. This breaks down and dissolves the lather, leaving the hair sections lying on the bottom of the glass. The after-treatment is that usually employed in mounting similar objects.

Hair Preparations

DANDRUFF CURES.

The treatment of that condition of the scalp which is productive of dandruff properly falls to the physician, but unfortunately the subject has not been much studied. One cure is said to be a sulphur lotion made by placing a little sublimed sulphur in water, shaking well, then allowing to settle, and washing the head every morning with the clear liquid.

Sulphur is said to be insoluble in water; yet a sulphur water made as above indicated has long been in use as a hair wash. A little glycerine improves the preparation, preventing the hair from becoming harsh by repeated washings.

The exfoliated particles of skin or "scales" should be removed only when entirely detached from the cuticle. They result from an irritation which is increased by forcible removal, and hence endeavors to clean the hair from them by combing or brushing it in such a way as to scrape the scalp are liable to be worse than useless. It follows that gentle handling of the hair is important when dandruff is present.

I.—Chloral hydrate	2 ounces
Resorcin	1 ounce
Tannin	1 ounce
Alcohol	8 ounces
Glycerine	4 ounces
Rose water to make	4 pints
II.—White wax	3½ drachms
Liquid petrolatum	2½ ounces
Rose water	1 ounce
Borax	15 grains
Precipitated sulphur	3½ drachms

Pine-Tar Dandruff Shampoo.—

Pine tar	4 parts
Linseed oil	40 parts

Heat these to 140° F.; make solution of potassa, U. S. P., 10 parts, and water, 45 parts; add alcohol, 5 parts, and gradually add to the heated oils, stirring constantly. Continue the heat until saponified thoroughly; and make up with water to 128 parts. When almost cool, add ol. lavender, ol. orange, and ol. bergamot, of each 2 parts.

HAIR-CURLING LIQUIDS.

It is impossible to render straight hair curly without the aid of the iron or paper and other curlers. But it is possible, on the other hand, to make artificial curls more durable and proof against outside influences, such as especially dampness of the air. Below are trustworthy recipes:

	I	II
Water	70	80
Spirit of wine	30	20
Borax	2	—
Tincture of benzoin	—	3
Perfume	ad. lib.	ad. lib.

HAIR DRESSINGS AND WASHES:

Dressings for the Hair.—

I.—Oil of wintergreen	20 drops
Oil of almond, essential	35 drops
Oil of rose, ethereal	1 drop
Oil of violets	30 drops
Tincture of cantharides	50 drops
Almond oil	2,000 drops

Mix.

Hair Embrocation.—

II.—Almond oil, sweet	280 parts
Spirit of sal ammoniac	280 parts
Spirit of rosemary	840 parts
Honey water	840 parts

Mix. Rub the scalp with it every morning by means of a sponge.

Hair Restorer.—

III.—Tincture of cantharides	7 parts
Gall tincture	7 parts
Musk essence	1 part
Carmine	0.5 part
Rectified spirit of wine	28 parts
Rose water	140 parts

To be used at night.

Rosemary Water.—

IV.—Rosemary oil	1½ parts
Rectified spirit of wine	7 parts
Magnesia	7 parts
Distilled water	1,000 parts

Mix the oil with the spirit of wine and rub up with the magnesia in a mortar; gradually add the water and finally filter.

Foamy Scalp Wash.—Mix 2 parts of soap spirit, 1 part of borax-glycerine (1+2), 6 parts of barium, and 7 parts of orange-flower water.

Lanolin Hair Wash.—Extract 4 parts quillaia bark with 36 parts water for several days, mix the percolate with 4 parts alcohol, and filter after having settled. Agitate 40 parts of the filtrate at a temperature at which wool grease becomes liquid, with 12 parts anhydrous lanolin, and fill up with water to which 15 per cent spirit of wine has been added, to 300 parts. Admixture, such as cinchona extract, Peru balsam, quinine, tincture of cantharides, bay-oil, ammonium carbonate, menthol, etc., may be made. The result is a yellowish-white, milky liquid, with a cream-like fat layer floating on the top, which is finely distributed by agitating.

Birch Water.—Birch water, which has many cosmetic applications, especially as a hair wash or an ingredient in hair washes, may be prepared as follows:

Alcohol, 96 per cent	3,500 parts
Water	700 parts
Potash soap	200 parts
Glycerine	150 parts
Oil of birch buds	50 parts
Essence of spring flowers	100 parts
Chlorophyll, q. s. to color.	

Mix the water with 700 parts of the alcohol, and in the mixture dissolve the soap. Add the essence of spring flowers and birch oil to the remainder of the alcohol, mix well, and to the mixture add, little by little, and with constant agitation, the soap mixture. Finally

add the glycerine, mix thoroughly, and set aside for 8 days, filter and color the filtrate with chlorophyll, to which add a little tincture of saffron. To use, add an equal volume of water to produce a lather.

Petroleum Hair Washes.—I.—Deodorized pale petroleum, 10 parts; citronella oil, 10 parts; castor oil, 5 parts; spirit of wine, 90 per cent, 50 parts; water, 75 parts.

II.—Quinine sulphate, 10 parts; acetic acid, 4 parts; tincture of cantharides, 30 parts; tincture of quinine, 3 parts; spirit of rosemary, 60 parts; balm water, 90 parts; barium, 120 parts; spirit of wine, 150 parts; water, 1,000 parts.

III.—Very pure petroleum, 1 part; almond oil, 2 parts.

Brilliantine.—I.—Olive oil, 4 parts; glycerine, 3 parts; alcohol, 3 parts; scent as desired. Shake before use.

II.—Castor oil, 1 part; alcohol, 2 parts; saffron to dye yellow. Scent as desired.

III.—Lard, 7 parts; spermaceti, 7 parts; almond oil, 7 parts; white wax, 1 part.

A Cheap Hair Oil.—I.—Sesame oil or sunflower oil, 1,000 parts; lavender oil, 15 parts; bergamot oil, 10 parts; and geranium oil, 5 parts.

II.—Sesame oil or sunflower oil, 1,000 parts; lavender oil, 12 parts; lemon oil, 20 parts; rosemary oil, 5 parts; and geranium oil, 2 parts.

HAIR DYES.

There is no hair dye which produces a durable coloration; the color becomes gradually weaker in the course of time. Here are some typical formulas in which a mordant is employed:

I.—Nitrate of silver.....	½ ounce
Distilled water.....	3 ounces
Mordant:	
Sulphuret of potassium.....	½ ounce
Distilled water.....	3 ounces
II.—	
(*a*) Nitrate of silver (crystal).....	1½ ounces
Distilled water.....	12 ounces
Ammonia water sufficient to make a clear solution.	

Dissolve the nitrate of silver in the water and add the ammonia water until the precipitate is redissolved.

(*b*) Pyrogallic acid.....	2 drachms
Gallic acid.....	2 drachms
Cologne water.....	2 ounces
Distilled water.....	4 ounces
III.—Nitrate of silver.....	20 grains
Sulphate of copper..	2 grains
Ammonia, quantity sufficient.	

Dissolve the salts in ½ ounce of water and add ammonia until the precipitate which is formed is redissolved. Then make up to 1 ounce with water. Apply to the hair with a brush. This solution slowly gives a brown shade. For darker shades, apply a second solution, composed of:

IV.—Yellow sulphide ammonium.....	2 drachms
Solution of ammonia	1 drachm
Distilled water.....	1 ounce

Black Hair Dye without Silver.—

V.—Pyrogallic acid....	3.5 parts
Citric acid.....	0.3 parts
Boro-glycerine....	11 parts
Water.....	100 parts

If the dye does not impart the desired intensity of color, the amount of pyrogallic acid may be increased. The wash is applied evenings, followed in the morning by a weak ammoniacal wash.

One Bottle Preparation.—

VI.—Nitrate of copper..	360 grains
Nitrate of silver...	7 ounces
Distilled water....	60 ounces
Water of ammonia, a sufficiency.	

Dissolve the salts in the water and add the water of ammonia carefully until the precipitate is all redissolved. This solution, properly applied, is said to produce a very black color; a lighter shade is secured by diluting the solution. Copper sulphate may be used instead of the nitrate.

Brown Hair Dyes.—A large excess of ammonia tends to produce a brownish dye. Various shades of brown may be produced by increasing the amount of water in the silver solution. It should be remembered that the hair must, previously to treatment, be washed with warm water containing sodium carbonate, well rinsed with clear water, and dried.

I.—Silver nitrate.....	480 grains
Copper nitrate...	90 grains
Distilled water...	8 fluidounces
Ammonia water, sufficient.	

Dissolve the two salts in the distilled water and add the ammonia water until the liquid becomes a clear fluid.

In using apply to the hair carefully

with a tooth-brush, after thoroughly cleansing the hair, and expose the latter to the rays of the sun.

II.—
Silver nitrate	30 parts
Copper sulphate, crystals	20 parts
Citric acid	20 parts
Distilled water	950 parts
Ammonia water, quantity sufficient to dissolve the precipitate first formed.	

Various shades of brown may be produced by properly diluting the solution before it be applied.

Bismuth subnitrate	200 grains
Water	2 fluidounces
Nitric acid, sufficient to dissolve, or about	420 grains

Use heat to effect solution. Also:

Tartaric acid	150 grains
Sodium bicarbonate	168 grains
Water	32 fluidounces

When effervescence of the latter has ceased, mix the cold liquids by pouring the latter into the former with constant stirring. Allow the precipitate to subside; transfer it to a filter or strainer, and wash with water until free from the sodium nitrate formed.

Chestnut Hair Dye.—

Bismuth nitrate	230 grains
Tartaric acid	75 grains
Water	100 minims

Dissolve the acid in the water, and to the solution add the bismuth nitrate and stir until dissolved. Pour the resulting solution into 1 pint of water and collect the magma on a filter. Remove all traces of acid from the magma by repeated washings with water; then dissolve it in:

Ammonia water	2 fluidrachms

And add:

Glycerine	20 minims
Sodium hyposulphite	75 grains
Water, enough to make	4 fluidounces.

HAIR RESTORERS AND TONICS:

Falling of the Hair.—After the scalp has been thoroughly cleansed by the shampoo, the following formula is to be used:

Salicylic acid	1 part
Precipitate of sulphur	2½ parts
Rose water	25 parts

The patient is directed to part the hair, and then to rub in a small portion of the ointment along the part, working it well into the scalp. Then another part is made parallel to the first, and more ointment rubbed in. Thus a series of first, longitudinal, and then transverse parts are made, until the whole scalp has been well anointed. Done in this way, it is not necessary to smear up the whole shaft of the hair, but only to reach the hair roots and the sebaceous glands, where the trouble is located. This process is thoroughly performed for six successive nights, and the seventh night another shampoo is taken. The eighth night the inunctions are commenced again, and this is continued for six weeks. In almost every case the production of dandruff is checked completely after six weeks' treatment, and the hair, which may have been falling out rapidly before, begins to take firmer root. To be sure, many hairs which are on the point of falling when treatment is begun will fall anyway, and it may even seem for a time as if the treatment were increasing the hair-fall, on account of the mechanical dislodgment of such hairs, but this need never alarm one.

After six weeks of such treatment the shampoo may be taken less frequently.

Next to dandruff, perhaps, the most common cause of early loss of hair is heredity. In some families all of the male members, or all who resemble one particular ancestor, lose their hair early. Dark-haired families and races, as a rule, become bald earlier than those with light hair. At first thought it would seem as though nothing could be done to prevent premature baldness when heredity is the cause, but this is a mistake. Careful hygiene of the scalp will often counterbalance hereditary predisposition for a number of years, and even after the hair has actually begun to fall proper stimulation will, to a certain extent, and for a limited time, often restore to the hair its pristine thickness and strength. Any of the rubefacients may be prescribed for this purpose for daily use, such as croton oil, 1½ per cent; tincture of cantharides, 15 per cent; oil of cinnamon, 40 per cent; tincture of capsicum, 15 per cent; oil of mustard, 1 per cent; or any one of a dozen others. Tincture of capsicum is one of the best, and for a routine prescription the following has served well:

Resorcin	5 parts
Tincture capsicum	15 parts
Castor oil	10 parts
Alcohol	100 parts
Oil of roses, sufficient.	

For Falling Hair.—

I.—Hydrochloric acid	75 parts
Alcohol	2,250 parts

The lotion is to be applied to the scalp every evening at bedtime.

II.—Tincture of cinchona	1 part
Tincture of rosemary	1 part
Tincture of jaborandi	1 part
Castor oil	2 parts
Rum	10 parts

Mix.

Jaborandi Scalp Waters for Increasing the Growth of Hair.—First prepare a jaborandi tincture from jaborandi leaves, 200 parts; spirit, 95 per cent, 700 parts; and water, 300 parts. After digesting for a week, squeeze out the leaves and filter the liquid. The hair wash is now prepared as follows:

I.—Jaborandi tincture, 1,000 parts; spirit, 95 per cent, 700 parts; water, 300 parts; glycerine, 150 parts; scent essence, 100 parts; color with sugar color.

II.—Jaborandi tincture, 1,000 parts; spirit, 95 per cent, 1,500 parts; quinine tannate, 4 parts; Peru balsam, 20 parts; essence heliotrope, 50 parts. Dissolve the quinine and the Peru balsam in the spirit and then add the jaborandi tincture and the heliotrope essence. Filter after a week. Rub into the scalp twice a week before retiring.

POMADES:

I.—Cinchona Pomade.—

Ox marrow	100 drachms
Lard	70 drachms
Sweet almond oil	17 drachms
Peru balsam	1 drachm
Quinine sulphate	1 drachm
Clover oil	2 drachms
Rose essence	25 drops

II.—Cantharides Pomade.—

Ox marrow	300 drachms
White wax	30 drachms
Mace oil	1 drachm
Clove oil	1 drachm
Rose essence or geranium oil	25 drops
Tincture of cantharides	8 drachms

Pinaud Eau de Quinine.—The composition of this nostrum is not known. Dr. Tsheppe failed to find in it any constituent of cinchona bark. The absence of quinine from the mixture probably would not hurt it, as the "tonic" effect of quinine on the hair is generally regarded as a myth.

On the other hand, it has been stated that this preparation contains:

Quinine sulphate	2 parts
Tincture of krameria	4 parts
Tincture of cantharides	2 parts
Spirit of lavender	10 parts
Glycerine	15 parts
Alcohol	100 parts

SHAMPOOS:

A Hair Shampoo is usually a tincture of odorless soft soap. It is mostly perfumed with lavender and colored with green aniline. Prepared the same as tr. sapon. virid. (U. S. P.), using an inexpensive soft soap, that is a good foam producer. Directions: Wet the hair well in warm water and rub in a few teaspoonfuls of the following formulas. No. I is considered the best:

	I	II	III	IV
	Parts used			
Cottonseed oil	—	24	26	14
Linseed oil	20	—	—	—
Malaga olive oil	20	—	—	—
Caustic potash	9½	8	6	3
Alcohol	5	4½	5	2
Water	30	26	34	16½

Warm the mixed oils on a large water bath, then the potash and water in another vessel, heating both to 158° F., and adding the latter hot solution to the hot oil while stirring briskly. Now add and thoroughly mix the alcohol. Stop stirring, keeping the heat at 158° F., until the mass becomes clear and a small quantity dissolves in boiling water without globules of oil separating. If stirred after the alcohol has been mixed the soap will be opaque. Set aside for a few days in a warm place before using to make liquid shampoo.

Liquid Shampoos.—

I.—Fluid extract of soap-bark	10 parts
Glycerine	5 parts
Cologne water	10 parts
Alcohol	20 parts
Rose water	30 parts
II.—Soft soap	24 parts
Potassium carbonate	5 parts
Alcohol	48 parts
Water enough to make	400 parts

Shampoo Pastes.—

I.—White castile soap, in shavings ..... 2 ounces
Ammonia water ... 2 fluidounces
Bay rum, or cologne water ..... 1 fluidounce
Glycerine ..... 1 fluidounce
Water ..... 12 fluidounces

Dissolve the soap in the water by means of heat; when nearly cold stir in the other ingredients.

II.—Castile soap, white 4 ounces
Potassium carbonate ..... 1 ounce
Water ..... 6 fluidounces
Glycerine ..... 2 fluidounces
Oil of lavender flowers ..... 5 drops
Oil of bergamot.... 10 drops

To the water add the soap, in shavings, and the potassium carbonate, and heat on a water bath until thoroughly softened; add the glycerine and oils. If necessary to reduce to proper consistency, more water may be added.

Egg Shampoo.—

Whites of ..... 2 eggs
Water ..... 5 fluidounces
Water of ammonia. 3 fluidounces
Cologne water .... ⅓ fluidounce
Alcohol ..... 4 fluidounces

Beat the egg whites to a froth, and add the other ingredients in the order in which they are named, with a thorough mixing after each addition.

Imitation Egg Shampoos.—Many of the egg shampoos are so called from their appearance. They usually contain no egg and are merely preparations of perfumed soft soap. Here are some formulas

I.—White castile soap... 4 ounces
Powdered curd soap.. 2 ounces
Potassium carbonate. 1 ounce
Honey ..... 1 ounce

Make a homogeneous paste by heating with water.

II.—Melt 3½ pounds of lard over a salt-water bath and run into it a lye formed by dissolving 8 ounces of caustic potassa in 1½ pints of water. Stir well until saponification is effected and perfume as desired.

Hair Straightener.—

I.—Beef Suet ..... 1 pound
Yellow Wax ..... 2 ounces
Castor oil ..... 2 ounces
Benzoic acid ..... 12 grains
Oil of lemon ..... 30 drops
Oil of cinnamon ..... 5 drops

Melt the wax and suet together, add the castor oil and the Benzoic acid, allow this to cool a little and then stir in the oils. By using this preparation twice a day, rubbing a small quantity through the hair, massaging well with the tips of fingers it will straighten kinky hair and make it lie flat.

II.—Petrolatum ..... ½ pound
Mutton suet rendered ½ pound
Beeswax ..... 3 ounces
Castor oil ..... 2 ounces
Benzoic acid ..... 10 grains
Oil of lemon or lemon grass ..... 1 fl. dram.
Oil Cassia ..... 15 drops

Melt the petrolatum, suet and wax by heat in a water bath and add the castor oil. Remove then from the fire and when nearly cold add the benzoic and the oil of lemon.

III.—Lanolin ..... 5 ounces
Cocoa butter ..... 3 ounces
Yellow wax ..... 3 ounces
Sesame oil ..... 5 ounces

Melt in a double boiler and mix well. Apply to the hair morning and night. Wash the hair once a week with tar soap and rinse well.

IV.—Sodium silicate ..... ¾ ounce
Sugar ..... 1 ounce
Water, soft, to make a total of one pint.

Add the sodium silicate and sugar to the water and allow to dissolve. This can then be perfumed if desired, with a water soluble perfume oil. By damping the hair well with this solution and rubbing it well in, the desired effect can be gained.

V.—2 pounds petrolatum (heavy yellow)
6 ounces yellow beeswax
½ ounce paraffin wax
4 ounces (fl.) castor oil
½ drachm boric acid
1 drachm camphor gum
1 drachm salicylic acid
3 drachms oil of lilac

Use a double boiler and mix together the first four ingredients, stirring well. Take off stove and add the camphor, stirring until it melts, and the mixture is of a creamy consistency. Then cool and add the boric and salicylic acid and oil of lilac, mixing thoroughly.

Anti-Kink Hair Cream.—

VI.—2 pounds (heavy grade yellow) petrolatum
8 ounces (av.) beeswax
4 ounces (fl.) Venice turpentine
9 ounces (fl.) hot glycerine

1 ounce (av.) powdered ammonium chloride
1 ounce (av.) powdered potassium nitrate
1 ounce (fl.) oil of lavender
3 drachms (av.) artificial musk

Mix well together the powdered ammonium chloride and potassium nitrate and then add hot glycerine (heat over water-bath). To this add ½ of the petrolatum and mix well. To the other half of the petrolatum, add the beeswax and turpentine, using a little heat to melt. Then remove from fire after they are melted and mixed. The first mixture can then be added and mixed to the second mixture. If you wish, perfume can be blended (oil of lavender and artificial musk).

VII.—Remove all grease by washing the hair thoroughly, and upon drying the hair well apply the cream made in an earthenware vessel:

2 ounces powdered Tragacanth
1 ounce boric acid
1½ quarts water

Make a uniform paste using a wooden spoon, and stir in previously dissolved:

1 ounce sodium carbonate
1 ounce potassium hydroxide
2 ounces glycerine
8 ounces water
⅛ of an ounce of oil of almond

When mixed well, transfer to a glass jar and keep covered.

Apply the paste to the hair and allow it to remain for about one hour. Then wash well with water to remove all paste from hair. Should the kink persist, several applications may be required.

To Extract Shellac from Fur Hats.—Use the common solvents, as carbon bisulphide, benzine, wood alcohol, turpentine, and so forth, reclaiming the spirit and shellac by a suitable still.

HEADACHE REMEDIES:

See also Pain Killers.

Headache Cologne.—As a mitigant of headache, cologne water of the farina type is refreshing.

Oil of neroli	6 drachms
Oil of rosemary	3 drachms
Oil of bergamot	3 drachms
Oil of cedrat	7 drachms
Oil of orange peel	7 drachms
Deodorized alcohol	1 gallon

To secure a satisfactory product from the foregoing formula it is necessary to look carefully to the quality of the oils. Oil of cedrat is prone to change, and oil of orange peel, if exposed to the atmosphere for a short time, becomes worthless, and will spoil the other materials.

A delightful combination of the acetic odor with that of cologne water may be had by adding to a pint of the foregoing, 2 drachms of glacial acetic acid. The odor so produced may be more grateful to some invalids than the neroli and lemon bouquet.

Still another striking variation of the cologne odor, suitable for the use indicated, may be made by adding to a pint of cologne water an ounce of ammoniated alcohol.

Liquid Headache Remedies.—

Acetanilid	60 grains
Alcohol	4 fluidrachms
Ammonium carbonate	30 grains
Water	2 fluidrachms
Simple elixir to make	2 fluidounces

Dissolve the acetanilid in the alcohol, the ammonium carbonate in the water, mix each solution with a portion of the simple elixir, and mix the whole together.

HEAT-INDICATING PAINT:

See Paint.

HEAT INSULATION:

See Insulation.

HEAT, PRICKLY:

See Household Formulas.

HEAT-RESISTANT LACQUERS:

See Lacquers.

HEAVES:

See Veterinary Formulas.

HEDGE MUSTARD.

Hedge mustard (erysimum) was at one time a popular remedy in France for hoarseness, and is still used in country districts, but is not often prescribed.

Liquid ammonia	10 drops
Syrup of erysimum	1½ ounces
Infusion of lime flowers	3 ounces

To be taken at one dose.

HERBARIUM SPECIMENS, MOUNTING.

A matter of first importance, after drying the herbarium specimens, is to poison them, to prevent the attacks of insects. This is done by brushing them over on both sides, using a camel's-hair pencil, with a solution of 2 grains of

corrosive sublimate to an ounce of methylated spirit. In tropical climates the solution is generally used of twice this strength. There are several methods of mounting them. Leaves with a waxy surface and coriaceous texture are best stitched through the middle after they have been fastened on with an adhesive mixture. Twigs of leguminous trees will often throw off their leaflets in drying. This may, in some measure, be prevented by dipping them in boiling water before drying, or if the leaves are not very rigid, by using strong pressure at first, without the use of hot water. If the specimens have to be frequently handled, the most satisfactory preparation is Lepage's fish glue, but a mixture of glue and paste, with carbolic acid added, is used in some large herbaria. The disadvantage of using glue, gum, or paste is that it is necessary to have some of the leaves turned over so as to show the under surface of the leaf, and some of the flowers and seeds placed loose in envelopes on the same sheet for purposes of comparison or microscopic examination. Another plan is to use narrow slips of gummed stiff but thin paper, such as very thin parchment paper. These strips are either gummed over the stems, etc., and pinched in round the stem with forceps, or passed through slits made in the sheet and fastened at the back. If the specimens are mounted on cards and protected in glass frames, stitching in the principal parts with gray thread produces a very satisfactory appearance.

Hectograph Pads and Inks

The hectograph is a gelatin pad used for duplicating letters, etc., by transfer. The pad should have a tough elastic consistency, similar to that of a printer's roller. The letter or sketch to be duplicated is written or traced on a sheet of heavy paper with an aniline ink (which has great tinctorial qualities). When dry this is laid, inked side down, on the pad and subjected to moderate and uniform pressure for a few minutes. It may then be removed, when a copy of the original will be found on the pad which has absorbed a large quantity of the ink. The blank sheets are laid one by one on the pad, subjected to moderate pressure over the whole surface with a wooden or rubber roller, or with the hand, and lifted off by taking hold of the corners and stripping them gently with an even movement. If this is done too quickly the composition may be torn. Each succeeding copy thus made will be a little fainter than its predecessor. From 40 to 60 legible copies may be made. When the operation is finished the surface of the pad should be gone over gently with a wet sponge and the remaining ink soaked out. The superfluous moisture is then carefully wiped off, when the pad will be ready for another operation.

The pad or hectograph is essentially a mixture of glue (gelatin) and glycerine. This mixture has the property of remaining soft yet firm for a long time and of absorbing and holding certain coloring matters in such a way as to give them up slowly or in layers, so to speak, on pressure.

Such a pad may be made by melting together 1 part of glue, 2 parts of water and 4 parts of glycerine (all by weight, of course), evaporating some of the water and tempering the mixture with more glue or glycerine if the season or climate require. The mass when of proper consistency, which can be ascertained by cooling a small portion, is poured into a shallow pan and allowed to set. Clean glue must be used or the mixture strained; and air bubbles should be removed by skimming the surface with a piece of card-board or similar appliance.

Variations of this formula have been proposed, some of which are appended:

I.—Glycerine	12	ounces
Gelatin	2	ounces
Water	7½	ounces
Sugar	2	ounces
II.—Water	10	ounces
Dextrin	1½	ounces
Sugar	2	ounces
Gelatin	15	ounces
Glycerine	15	ounces
Zinc oxide	1½	ounces
III.—Gelatin	10	ounces
Water	40	ounces
Glycerine	120	ounces
Barium sulphate	8	ounces

The Tokacs patent composition, besides the usual ingredients, such as gelatin, glycerine, sugar, and gum, contains soap, and can therefore be washed off much easier for new use. The smoothness of the surface is also increased, without showing more sticking capacity with the first impressions.

Hectograph Inks (see also Inks).—The writing to be copied by means of the hectograph is done on good paper with an aniline ink. Formulas for suitable ones are appended. It is said that more copies can be obtained from writing with the purple ink than with other kinds:

Purple.—

I.—Methyl violet	2 parts
Alcohol	2 parts
Sugar	1 part
Glycerine	4 parts
Water	24 parts

Dissolve the violet in the alcohol mixed with the glycerine; dissolve the sugar in the water; mix both solutions.

II.—A good purple hectograph ink is made as follows: Dissolve 1 part methyl violet in 8 parts of water and add 1 part of glycerine. Gently warm the solution for an hour, and add, when cool, ¼ part alcohol. Or take methyl violet, 1 part; water, 7 parts; and glycerine, 2 parts.

Black.—

Methyl violet	10 parts
Nigrosin	20 parts
Glycerine	30 parts
Gum arabic	5 parts
Alcohol	60 parts

Blue.—

Resorcin blue M	10 parts
Dilute acetic acid	1 part
Water	85 parts
Glycerine	4 parts
Alcohol	10 parts

Dissolve by heat.

Red.—

Fuchsin	10 parts
Alcohol	10 parts
Glycerine	10 parts
Water	50 parts

Green.—

Aniline green, water soluble	15 parts
Glycerine	10 parts
Water	50 parts
Alcohol	10 parts

Repairing Hectographs.—Instead of remelting the hectograph composition, which is not always successful, it is recommended to pour alcohol over the surface of the cleaned mass and to light it. After solidifying, the surface will be again ready for use.

HEMORRHOIDS:
See Piles.

HERB VINEGAR:
See Vinegar.

HIDES:
See Leather.

HIDE BOUND:
See Veterinary Formulas.

HIDE-CLEANING PROCESSES:
See Cleaning Preparations and Methods.

HOARHOUND CANDY:
See Confectionery.

HOARSENESS, CREAM BON-BONS FOR:
See Confectionery.

HOARSENESS, REMEDY FOR:
See Cough and Cold Mixtures and Turpentine.

HONEY:

Honey Clarifier.—For 3,000 parts of fresh honey, take 875 parts of water, 150 parts of washed, dried, and pulverized charcoal, 70 parts of powdered chalk, and the whites of 3 eggs beaten in 90 parts of water. Put the honey and the chalk in a vessel capable of containing ⅓ more than the mixture and boil for 3 minutes; then introduce the charcoal and stir up the whole. Add the whites of the eggs while continuing to stir, and boil again for 3 minutes. Take from the fire, and after allowing the liquid to cool for a quarter of an hour, filter, and to secure a perfectly clear liquid refilter on flannel.

Detecting Dyed Honey.—For the detection of artificial yellow dyestuff in honey, treat the aqueous yellow solution with hydrochloric acid, as well as with ammonia; also extract the dyestuff from the acid or ammoniacal solution by solvents, such as alcohol or ether, or conduct the Arata wool test in the following manner: Dissolve 10 parts of honey in 50 parts of water, mix with 10 parts of a 10 per cent potassium-bisulphate solution and boil the woolen thread in this liquid for 10 minutes.

HOP ESSENCE:

To 10 pounds of proof spirit add 1 pound freshly dried hop flowers and after 6 days press out about 9 pounds of extract.

HOP BITTER BEER:
See Beverages.

HOP SYRUP:
See Essences and Extracts.

HORN:

Artificial Horn.—To prepare artificial horn from compounds of nitro-cellulose and casein, by hardening them and removing their odor of camphor, the compounds are steeped in formaldehyde from several hours to as many days,

according to the thickness of the object treated. When the formaldehyde has penetrated through the mass and dissolved the camphor, the object is taken out of the liquid and dried. Both the camphor extracted and the formaldehyde used can be recovered by distillation, and used over again, thus cheapening the operation.

Dehorners or Horn Destroyers.—The following are recommended by the Board of Agriculture of Great Britain:

Clip the hair from the top of the horn when the calf is from 2 to 5 days old. Slightly moisten the end of a stick of caustic potash with water or saliva (or moisten the top of the horn bud) and rub the tip of each horn firmly with the potash for about a quarter of a minute, or until a slight impression has been made on the center of the horn. The horns should be treated in this way from 2 to 4 times at intervals of 5 minutes. If, during the interval of 5 minutes after one or more applications, a little blood appears in the center of the horn, it will then only be necessary to give another very slight rubbing with the potash.

The following directions should be carefully observed: The operation is best performed when the calf is under 5 days old, and should not be attempted after the ninth day. When not in use the caustic potash should be kept in a stoppered glass bottle in a dry place, as it rapidly deteriorates when exposed to the air. One man should hold the calf while an assistant uses the caustic. Roll a piece of tin foil or brown paper round the end of the stick of caustic potash, which is held by the fingers, so as not to injure the hand of the operator. Do not moisten the stick too much, or the caustic may spread to the skin around the horn and destroy the flesh. For the same reason keep the calf from getting wet for some days after the operation. Be careful to rub on the center of the horn and not around the side of it.

Staining Horns.—A brown stain is given to horns by covering them first with an aqueous solution of potassium ferrocyanide, drying them, and then treating with a hot dilute solution of copper sulphate. A black stain can be produced in the following manner:

After having finely sandpapered the horns, dissolve 50 to 60 grains of nitrate of silver in 1 ounce of distilled water. It will be colorless. Dip a small brush in, and paint the horns where they are to be black. When dry, put them where the sun can shine on them, and you will find that they will turn jet black, and may then be polished.

To Soften Horn.—Lay the horn for 10 days in a solution of water, 1 part; nitric acid, 3 parts; wood vinegar, 2 parts; tannin, 5 parts; tartar, 2 parts; and zinc vitriol, 2.5 parts.

HOSIERY:

To Stop Runs in Silk Hosiery.—Put dry stockings in a mixture of—

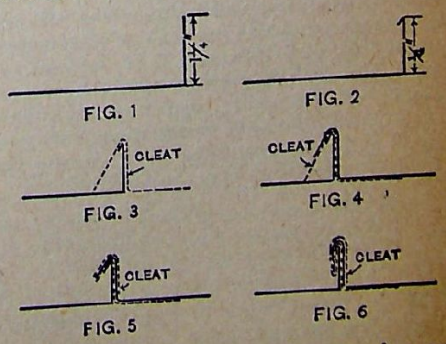
Aluminum ammonium sulphate (ammonia alum)	1 ounce
Water	1 quart

for about half an hour. Then remove and rinse and wash in soapy water.

Household Formulas

How to Lay Galvanized Iron Roofing.—The use of galvanized iron for general roofing work has increased greatly during the past few years. It has many features which commend it as a roofing material, but difficulties have been experienced by beginners as to the proper method of applying it to the roof. The weight of material used is rather heavy to permit of double seaming, but a method has been evolved that is satisfactory. Galvanized iron roofing can be put on at low cost, so as to be water-tight and free from buckling at the joints. The method does away with double seaming, and is considered more suitable than the latter for roofing purposes wherever it can be laid on a roof steeper than 1 to 12.

Galvanized iron of No. 28 and heavier gauges is used, the sheets being lap-seamed and soldered together in strips in the shop the proper length to apply to the roof. After the sheets are fastened together a 1¼-inch edge is turned up the entire length of one side of the sheet, as indicated in Fig. 1. This operation is



done with tongs having gauge pins set at the proper point. The second oper-

ation consists in turning a strip ¼ inch wide toward the sheet, as shown in Fig. 2. This sheet is then laid on the roof, and a cleat about 8 inches long and 1 inch wide, made of galvanized iron, is nailed to the roof close to the sheet and bent over it, as shown in Fig. 3.

A second sheet having 1½ inches turned up is now brought against the first sheet and bent over both sheet and cleat, as shown in Fig. 4. The cleat is then bent backward over the second sheet and cut off close to the roof, as in Fig. 5, after which the seams are drawn together by double seaming tools, as the occasion demands, and slightly hammered with a wooden mallet. The finished seam is shown in Fig. 6. It will be seen that the second sheet of galvanized iron, cut ¼ inch longer than the first, laps over the former, making a sort of bead which prevents water from driving in. Cleats hold both sheets firmly to the roof and are nailed about 12 inches apart. Roofs of this character, when laid with No. 28 gauge iron, cost very little more than the cheaper grades of tin, and do not have to be painted.

Applications for Prickly Heat.—Many applications for this extremely annoying form of urticaria have been suggested and their efficacy strongly urged by the various correspondents of the medical press who propose them, but none of them seem to be generally efficacious. Thus, sodium bicarbonate in strong, aqueous solution, has long been a domestic remedy in general use, but it fails probably as often as it succeeds. A weak solution of copper sulphate has also been highly extolled, only to disappoint a very large proportion of those who resort to it. And so we might go on citing remedies which may sometimes give relief, but fail in the large proportion of cases. In this trouble, as in almost every other, the idiosyncrasies of the patient play a great part in the effects produced by any remedy. It is caused, primarily by congestion of the capillary vessels of the skin, and anything that tends to relieve this congestion will give relief, at least temporarily. Among the newer suggestions are the following:

Alcohol	333 parts
Ether	333 parts
Chloroform	333 parts
Menthol	1 part

Mix. Directions: Apply occasionally with a sponge.

Among those things which at least assist one in bearing the affliction is frequent change of underwear. The undergarments worn during the day should never be worn at night. Scratching or rubbing should be avoided where possible. Avoid stimulating food and drinks, especially alcohol, and by all means keep the bowels in a soluble condition.

Cleaning and Polishing Linoleum.—Wash the linoleum with a mixture of equal parts of milk and water, wipe dry, and rub in the following mixture by means of a cloth rag: Yellow wax, 5 parts; turpentine oil, 11 parts; varnish, 5 parts. As a glazing agent, a solution of a little yellow wax in turpentine oil is also recommended. Other polishing agents are:

I.—Palm oil, 1 part; paraffine, 18; kerosene, 4.

II.—Yellow wax, 1 part; carnauba wax, 2; turpentine oil, 10; benzine, 5.

Lavatory Deodorant.—

Sodium bicarbonate	5 ounces
Alum	5½ ounces
Potassium bromide	4 ounces
Hydrochloric acid	enough.
Water enough to make	4 pints.

To 3 parts of boiling water add the alum and then the bicarbonate. Introduce enough hydrochloric acid to dissolve the precipitate of aluminum hydrate which forms and then add the potassium bromide. Add enough water to bring the measure of the finished product up to 4 pints.

Removal of Odors from Wooden Boxes, Chests, Drawers, etc.—This is done by varnishing them with a solution of shellac, after the following manner: Make a solution of shellac, 1,000 parts; alcohol, 90 per cent to 95 per cent, 1,000 parts; boric acid, 50 parts; castor oil, 50 parts. The shellac is first dissolved in the alcohol and the acid and oil added afterwards. For the first coating use 1 part of the solution cut with from 1 to 2 parts of alcohol, according to the porosity of the wood—the more porous the less necessity for cutting. When the first coat is absorbed and dried in, repeat the application, if the wood is very porous, with the diluted shellac, but if of hard, dense wood, the final coating may be now put on, using the solution without addition of alcohol. If desired, the solution may be colored with any of the alcohol soluble aniline colors. The shellac solution, by the way, may be applied to the outside of chests, etc., and finished off after the fashion of "French polish."

When used this way, a prior application of 2 coats of linseed oil is advisable.

Stencil Marking Ink that will Wash Out.—Triturate together 1 part of fine soot and 2 parts of Prussian blue, with a little glycerine; then add 3 parts of gum arabic and enough glycerine to form a thin paste.

Washing Fluid.—Take 1 pound sal soda, ½ pound good stone lime, and 5 quarts of water; boil a short time, let it settle, and pour off the clear fluid into a stone jug, and cork for use; soak the white clothes overnight in simple water, wring out and soap wristbands, collars, and dirty or stained places. Have the boiler half filled with water just beginning to boil, then put in 1 common teacupful of fluid, stir and put in your clothes, and boil for half an hour, then rub lightly through one suds only, and all is complete.

Starch Luster.—A portion of stearine, the size of an old fashioned cent, added to starch, ½ pound, and boiled with it for 2 or 3 minutes, will add greatly to the beauty of linen, to which it may be applied.

To Make Loose Nails in Walls Rigid.—As soon as a nail driven in the wall becomes loose and the plastering begins to break, it can be made solid and firm by the following process: Saturate a bit of wadding with thick dextrin or glue; wrap as much of it around the nail as possible and reinsert the latter in the hole, pressing it home as strongly as possible. Remove the excess of glue or dextrin, wiping it cleanly off with a rag dipped in clean water; then let dry. The nail will then be firmly fastened in place. If the loose plastering be touched with the glue and replaced, it will adhere and remain firm.

How to Keep Lamp Burners in Order.—In the combustion of coal oil a carbonaceous residue is left, which attaches itself very firmly to the metal along the edge of the burner next the flame. This is especially true of round burners, where the heat of the flame is more intense than in flat ones, and the deposit of carbon, where not frequently removed, soon gets sufficiently heavy to interfere seriously with the movement of the wick up or down. The deposit may be scraped off with a knife blade, but a much more satisfactory process of getting rid of it is as follows: Dissolve sodium carbonate, 1 part, in 5 or 6 parts of water, and in this boil the burner for 5 minutes or so. When taken out the burner will look like a new one, and acts like one, provided that the apparatus for raising and lowering the wick has not previously been bent and twisted by attempting to force the wick past rough deposits.

To Remove the Odor from Pasteboard.—Draw the pasteboard through a 3 per cent solution of viscose in water. The pasteboard must be calendered after drying.

To Remove Woody Odor—To get rid of that frequently disagreeable smell in old chests, drawers, etc., paint the surface over with the following mixture:

Acetic ether.....	100 parts
Formaldehyde.....	6 parts
Acid, carbolic.....	4 parts
Tincture of eucalyptus leaves.....	60 parts

Mix. After applying the mixture expose the article to the open air in the sunlight.

To Keep Flies Out of a House.—Never allow a speck of food to remain uncovered in dining room or pantry any length of time after meals. Never leave remnants of food exposed that you intend for cat or hens. Feed at once or cover their food up a distance from the house. Let nothing decay near the house. Keep your dining room and pantry windows open a few inches most of the time. Darken your room and pantry when not in use. If there should be any flies they will go to the window when the room is darkened, where they are easily caught, killed, or brushed out.

An Easy Way to Wash a Heavy Comfortable.—Examine the comfortable, and if you find soiled spots soap them and scrub with a small brush. Hang the comfortable on a strong line and turn the hose on. When one side is washed turn and wash the other. The water forces its way through cotton and covering, making the comfortable as light and fluffy as when new. Squeeze the corners and ends as dry as possible.

Preservation of Carpets.—Lay sheets of brown paper under the carpet. This gives a soft feeling to the foot, and by diminishing the wear adds longer life to the carpet; at the same time it tends to keep away the air and renders the apartments warm.

To Do Away with Wiping Dishes.—Make a rack by putting a shelf over the kitchen sink, slanting it so that the water

will drain off into the sink. Put a lattice railing about 6 inches high at the front and ends of the shelf so that dishes can be set against it on their edges without falling out. Have 2 pans of hot water. Wash the dishes in one and rinse them in the other. Set them on edge in the rack and leave until dry.

A Convenient Table.—

Ten common-sized eggs weigh 1 pound.

Soft butter, the size of an egg, weighs 1 ounce.

One pint of coffee and of sugar weighs 12 ounces.

One quart of sifted flour (well heaped) weighs 1 pound.

One pint of best brown sugar weighs 12 ounces.

How to Make a Cellar Waterproof.— The old wall surface should be roughened and perfectly cleaned before plastering is commenced. It may be advisable to put the first coat on not thicker than ¼ inch, and after this has set it may be cut and roughened by a pointing trowel. Then apply a second ¼-inch coat and finish this to an even and smooth surface. Proportion of plaster: One-half part slaked lime, 1 part Portland cement, part fine, sharp sand, to be mixed well and applied instantly.

Removing Old Wall Paper.—Some paper hangers remove old paper from walls by first dampening it with water in which a little baking soda has been dissolved, the surface being then gone over with a "scraper" or other tool. However, the principle object of any method is to soften the old paste. This may be readily accomplished by first wetting a section of the old paper with cold or tepid water, using a brush, repeating the wetting until the paper and paste are soaked through, when the paper may easily be pulled off, or, if too tender, may be scraped with any instrument of a chisel form shoved between the paper and the wall. The wall should then be washed with clean water, this operation being materially assisted by wetting the wall ahead of the washing.

Stained Ceilings.—Take unslaked white lime, dilute with alcohol, and paint the spots with it. When the spots are dry—which will be soon, as the alcohol evaporates and the lime forms a sort of insulating layer—one can proceed painting with size color, and the spots will not show through again.

To Overcome Odors in Freshly Papered Rooms.—After the windows and doors of such rooms have been closed, bring in red-hot coal and strew on this several handfuls of juniper berries. About 12 hours later open all windows and doors, so as to admit fresh air, and it will be found that the bad smell has entirely disappeared.

Treatment of Damp Walls.—I.—A good and simple remedy to obviate this evil is caoutchouc glue, which is prepared from rubber hose. The walls to be laid dry are first to be thoroughly cleaned by brushing and rubbing off; then the caoutchouc size, which has been previously made liquid by heating, is applied with a broad brush in a uniform layer—about 8 to 12 inches higher than the wall appears damp—and finally paper is pasted over the glue when the latter is still sticky. The paper will at once adhere very firmly. Or else, apply the liquefied glue in a uniform layer upon paper (wall paper, caoutchouc paper, etc.). Upon this, size paint may be applied, or it may be covered with wall paper or plaster.

If the caoutchouc size is put on with the necessary care—i. e., if all damp spots are covered with it—the wall is laid dry for the future, and no peeling off of the paint or the wall paper needs to be apprehended. In cellars, protection from dampness can be had in a like manner, as the caoutchouc glue adheres equally well to all surfaces, whether stone, glass, metal, or wood.

II.—The walls must be well cleaned before painting. If the plaster should be worn and permeated with saltpeter in places it should be renewed and smoothed. These clean surfaces are coated twice with a water-glass solution, 1.1, using a brush and allowed to dry well. Then they are painted 3 times with the following mixture: Dissolve 100 parts, by weight, of mastic in 10 parts of absolute alcohol; pour 1,000 parts of water over 200 parts of isinglass; allow to soak for 6 hours; heat to solution and add 100 parts of alcohol (50 per cent). Into this mixture pour a hot solution of 50 parts of ammonia in 250 parts of alcohol (50 per cent), stir well, and subsequently add the mastic solution and stand aside warm, stirring diligently. After 5 minutes take away from the fire and painting may be commenced. Before a fresh application, however, the solution should be removed.

When this coating has dried completely it is covered with oil or varnish paint, preferably the latter. In the same manner the exudation of so-called saltpeter

in fresh masonry or on the exterior of façades, etc., may be prevented, size paint or lime paint being employed instead of the oil-varnish paint. New walls which are to be painted will give off no more saltpeter after 2 or 3 applications of the isinglass solution, so that the colors of the wall paper will not be injured either. Stains caused by smoke, soot, etc., on ceilings of rooms, kitchens, or corridors which are difficult to cover up with size paint, may also be completely isolated by applying the warm isinglass solution 2 or 3 times. The size paint is, of course, put on only after complete drying of the ceilings.

To Protect Papered Walls from Vermin.—It is not infrequent that when the wall paper becomes defective or loose in papered rooms, vermin, bed bugs, ants, etc., will breed behind it. In order to prevent this evil a little colocynth powder should be added to the paste used for hanging the paper, in the proportion of 50 or 60 parts for 3,000 parts.

Care of Refrigerators.—See that the sides or walls of all refrigerators are occasionally scoured with soap, or soap and slaked lime.

Dust Preventers.—Against the beneficial effects to be observed in the use of most preparations we must place the following bad effects: The great smoothness and slipperiness of the boards during the first few days after every application of the dressing, which forbids the use of the latter on steps, floors of gymnasia, dancing floors, etc. The fact that the oil or grease penetrates the soles of the boots or shoes, the hems of ladies' dresses, and things accidentally falling to the floor are soiled and spotted. Besides these there is, especially during the first few days after application, the dirty dark coloration which the boards take on after protracted use of the oils. Finally, there is the considerable cost of any process, especially for smaller rooms and apartments. In schoolrooms and railroad waiting rooms and other places much frequented by children and others wearing shoes set with iron, the boards soon become smooth from wear, and for such places the process is not suited.

According to other sources of information, these evil tendencies of the application vanish altogether, or are reduced to a minimum, if (1) entirely fresh, or at least, not rancid oils be used; (2) if, after each oiling, a few days be allowed to elapse before using the chamber or hall, and finally (3), if resort is not had to costly foreign special preparations, but German goods, procurable at wholesale in any quantity, and at very low figures.

The last advice (to use low-priced preparations) seems sensible since according to recent experiments, none of the oils experimented upon possess any especial advantages over the others.

An overwhelming majority of the laboratories for examination have given a verdict in favor of oil as a dust-suppressing application for floors, and have expressed a desire to see it in universal use. The following is a suggestion put forth for the use of various preparations:

This dust-absorbing agent has for its object to take up the dust in sweeping floors, etc., and to prevent its development. The production is as follows: Mix in an intimate manner 12 parts, by weight, of mineral sperm oil with 88 parts, by weight, of Roman or Portland cement, adding a few drops of mirbane oil. Upon stirring a uniform paste forms at first, which then passes into a greasy, sandy mass. This mass is sprinkled upon the surface to be swept and cleaned of dust, next going over it with a broom or similar object in the customary manner, at which operation the dust will mix with the mass. The preparation can be used repeatedly.

HOW TO FLUFF THE HAIR:

Hair can be fluffed and made to stand out well from the head, even without curling, by brushing it with an outward twist of the wrist that lifts the hair up from the scalp. For this brushing divide the hair into strands and go over the head in a circle, then begin further up and continue until all the hair has been lifted and lightened. If this style of brushing is kept up daily, or even several times a week, the straightest and stringiest of hair soon becomes dry and easy to puff out from the face.

HYDROMETER AND ITS USE.

Fill the tall cylinder or test glass with the spirit to be tested and see that it is of the proper temperature (60° F.). Should the thermometer indicate a higher temperature wrap the cylinder in cloths which have been dipped in cold water until the temperature falls to the required degree. If too low a temperature is indicated, reverse the process, using warm instead of cold applications. When 60° is reached note the specific gravity on the floating hydrometer. Have the cylinder filled to the top and look across the top of the liquid at the mark on the hydrometer. This is to preclude an

incorrect reading by possible refraction in the glass cylinder.

HYGROMETERS AND HYGROSCOPES:

Paper Hygrometers.—Paper hygrometers are made by saturating white blotting paper with the following liquid and then hanging up to dry:

Cobalt chloride.....	1 ounce
Sodium chloride.....	½ ounce
Calcium chloride.....	75 grains
Acacia.....	¼ ounce
Water.....	3 ounces

The amount of moisture in the atmosphere is roughly indicated by the changing color of the papers, as follows:

Rose red.....	rain
Pale red	very moist
Bluish red.....	moist
Lavender blue....	nearly dry
Blue.....	very dry

Colored Hygroscopes.—These instruments are often composed of a flower or a figure, of light muslin or paper, immersed in one of the following solutions:

I.—Cobalt chloride....	1 part
Gelatin.....	10 parts
Water.....	100 parts

The normal coloring is pink; this color changes into violet in medium humid weather and into blue in very dry weather.

II.—Cupric chloride...	1 part
Gelatin.....	10 parts
Water.....	100 parts

The color is yellow in dry weather.

III.—Cobalt chloride....	1 part
Gelatin.....	20 parts
Nickel oxide.....	75 parts
Cupric chloride....	25 parts
Water	200 parts

The color is green in dry weather.

HYOSCYAMUS, ANTIDOTE TO:

See Atropine.

ICE:

See also Refrigeration.

Measuring the Weight of Ice.—A close estimate of the weight of ice can be reached by multiplying together the length, breadth, and thickness of the block in inches, and dividing the product by 30. This will be very closely the weight in pounds. Thus, if a block is 10 x 10 x 9, the product is 900, and this divided by 30 gives 30 pounds as correct weight. A block 10 x 10 x 6 weighs 20 pounds. This simple method can be easily applied, and it may serve to remove unjust suspicions, or to detect short weight.

To Keep Ice in Small Quantities.—To keep ice from melting, attention is called to an old preserving method. The ice is cracked with a hammer between 2 layers of a strong cloth. Tie over a common unglazed flower-pot, holding about 2 to 4 quarts and placed upon a porcelain dish, a piece of white flannel in such a manner that it is turned down funnel-like into the interior of the pot without touching the bottom. Placed in this flannel funnel the cracked ice keeps for days.

ICE FLOWERS.

Make a 2 per cent solution of the best clear gelatin in distilled water, filter, and flood the filtrate over any surface which it is desired to ornament. Drain off slightly, and if the weather is sufficiently cold, put the plate, as nearly level as possible, out into the cold air to freeze. In freezing, water is abstracted from the colloidal portion, which latter then assumes an efflorescent form, little flowers, with exuberant, graceful curves of crystals, showing up as foliage, from all over the surface. To preserve in permanent form all that is necessary is to flood them with absolute alcohol. This treatment removes the ice, thus leaving a lasting framework of gelatin which may be preserved indefinitely. In order to do this, as soon as the gelatin has become quite dry it should be either varnished, flowed with an alcoholic solution of clear shellac, or the gelatin may be rendered insoluble by contact, for a few moments, with a solution of potassium bichromate, and subsequent exposure to sunlight.

IODINE STAINS, TO REMOVE:

Soak the garment which is stained in strong solution of sodium thiosulphate (hypo or photographer's hypo) until whitened and then wash in clear running water to remove the hypo.

INCUBATOR TO FUMIGATE:

For best results, an incubator should not only be cleaned thoroughly before it is used, but it should also be fumigated. Get a formaldehyde candle from a drug store. Set it in the incubator. Light it and close the door almost tight. The fumes will kill all the germs that may be lodging there and this will better your chances of getting a good hatch. Air the incubator two days before setting eggs.

INK ERADICATORS:

See Cleaning Preparations and Methods.

IGNITING COMPOSITION.

Eight parts of powdered manganese, 10 parts of amorphous phosphorus, and 5 parts of glue. The glue is soaked in water, dissolved in the heat, and the manganese and the phosphorus stirred in, so that a thinly liquid paste results, which is applied by means of a brush. Allow to dry well. This, being free from sulphur, can be applied on match-boxes.

Inks

BLUEPRINT INKS.

I.—For red-writing fluids for blueprints, take a piece of common washing soda the size of an ordinary bean, and dissolve it in 4 tablespoonfuls of ordinary red-writing ink, to make a red fluid. To keep it from spreading too much, use a fine pen to apply it with, and write fast so as not to allow too much of the fluid to get on the paper, for it will continue eating until it is dry.

II.—For red and white solutions for writing on blueprints, dissolve a crystal of oxalate of potash about the size of a pea in an ink-bottle full of water. This will give white lines on blueprints; other potash solutions are yellowish. If this shows a tendency to run, owing to too great strength, add more water and thicken slightly with mucilage. Mix this with red or any other colored ink about half and half, and writing may be done on the blueprints in colors corresponding to the inks used.

III.—Add to a small bottle of water enough washing soda to make a clear white line, then add enough gum arabic to it to prevent spreading and making ragged lines. To make red lines dip the pen in red ink and then add a little of the solution by means of the quill.

IV.—For white ink, grind zinc oxide fine on marble and incorporate with it a mucilage made with gum tragacanth. Thin a little for use. Add a little oil of cloves to prevent mold, and shake from time to time.

V.—A fluid which is as good as any for writing white on blueprints is made of equal parts of sal soda and water.

VI.—Mix equal parts of borax and water.

Both these fluids, V and VI, must be used with a fine-pointed pen; a pen with a blunt point will not work well.

DRAWING INKS:

Blue Ruling Ink.—Good vitriol, 4 ounces; indigo, 1 ounce. Pulverize the indigo, add it to the vitriol, and let it stand exposed to the air for 6 days, or until dissolved; then fill the pots with chalk, add fresh gall, ½ gill, boiling it before use.

Black Ruling Ink.—Take good black ink, and add gall as for blue. Do not cork it, as this prevents it from turning black.

Carbon Ink.—Dissolve real India ink in common black ink, or add a small quantity of lampblack previously heated to redness, and ground perfectly smooth, with a small portion of the ink.

Carmine.—The ordinary solution of carmine in ammonia water, after a short time in contact with steel, becomes blackish red, but an ink may be made that will retain its brilliant carmine color to the last by the following process, given by Dingler: Triturate 1 part of pure carmine with 15 parts of acetate of ammonia solution, with an equal quantity of distilled water in a porcelain mortar, and allow the whole to stand for some time. In this way, a portion of the alumina, which is combined with the carmine dye, is taken up by the acetic acid of the ammonia salt, and separates as a precipitate, while the pure pigment of the cochineal remains dissolved in the half-saturated ammonia. It is now filtered and a few drops of pure white sugar syrup added to thicken it. A solution of gum arabic cannot be used to thicken it, since the ink still contains some acetic acid, which would coagulate the bassorine, one of the constituents of the gum.

Liquid Indelible Drawing Ink.—Dissolve, by boiling, 2 parts of blond (golden yellow) shellac in 1.6 parts, by weight, of sal ammoniac, 16°, with 10 parts, by weight, of distilled water, and filter the solution through a woolen cloth. Now dissolve or grind 0.5 parts, by weight, of shellac solution with 0.01 part, by weight, of carbon black. Also dissolve .03 parts of nigrosin in 0.4 parts of distilled water and pour both solutions together. The mixture is allowed to settle for 2 days and the ready ink is drawn off from the sediment.

GLASS, CELLULOID, AND METAL INKS:

See also Etching.

Most inks for glass will also write on celluloid and the metals. The following

I and II are the most widely known recipes:

I.—In 500 parts of water dissolve 36 parts of sodium fluoride and 7 parts of sodium sulphate. In another vessel dissolve in the same amount of water 14 parts of zinc chloride and to the solution add 56 parts of concentrated hydrochloric acid. To use, mix equal volumes of the two solutions and add a little India ink; or, in the absence of this, rub up a little lampblack with it. It is scarcely necessary to say that the mixture should not be put in glass containers, unless they are well coated internally with paraffine, wax, gutta-percha, or some similar material. To avoid the inconvenience of keeping the solutions in separate bottles, mix them and preserve in a rubber bottle. A quill pen is best to use in writing with this preparation, but metallic pens may be used, if quite clean and new.

II.—In 150 parts of alcohol dissolve 20 parts of rosin, and add to this, drop by drop, stirring continuously, a solution of 35 parts of borax in 250 parts of water. This being accomplished, dissolve in the solution sufficient methylene blue to give it the desired tint.

Ink for Writing on Glazed Cardboard.—The following are especially recommended for use on celluloid:

I.—Dissolve 4 drachms of brown shellac in 4 ounces of alcohol. Dissolve 7 drachms of borax in 6 ounces of distilled water. Pour the first solution slowly into the second and carefully mix them, after which add 12 grains of aniline dye of the desired color. Violet, blue, green, red, yellow, orange, or black aniline dyes can be used.

Such inks may be used for writing on bottles, and the glass may be cleaned with water without the inscription being impaired.

II.—Ferric chloride.... 10 parts
Tannin..... 15 parts
Acetone..... 100 parts

Dissolve the ferric chloride in a portion of the acetone and the tannin in the residue, and mix the solutions.

III.—Dissolve a tar dyestuff of the desired color in anhydrous acetic acid.

Indelible Inks for Glass or Metal.—Schobel recommends the following inks for marking articles of glass, glass slips for microscopy, reagent flasks, etc., in black:

I.—Sodium silicate.....1 to 2 parts
Liquid India ink.... 1 part

For white:

II.—Sodium water glass 3 to 4 parts
Chinese white..... 1 part

Instead of Chinese white, a sufficient amount of the so-called permanent white (barium sulphate) may be used. The containers for these inks should be kept air-tight. The writing in either case is not attacked by any reagent used in microscopical technique but may be readily scraped away with a knife. The slips or other articles should be as near chemically clean as possible, before attempting to write on them.

According to Schuh, a mixture of a shellac solution and whiting or precipitated chalk answers very well for marking glass. Any color may be mixed with the chalk. If the glass is thoroughly cleaned with alcohol or ether, either a quill pen or a camel's-hair pencil (or a fresh, clean steel pen) may be used.

Ink on Marble.—Ink marks on marble may be removed with a paste made by dissolving an ounce of oxalic acid and half an ounce of butter of antimony in a pint of rain water, and adding sufficient flour to form a thin paste. Apply this to the stains with a brush; allow it to remain on 3 or 4 days and then wash it off. Make a second application, if necessary.

Perpetual Ink.—I.—Pitch, 3 pounds; melt over the fire, and add of lampblack, ¾ pound; mix well.

II.—Trinidad asphaltum and oil of turpentine, equal parts. Used in a melted state to fill in the letters on tombstones, marbles, etc. Without actual violence, it will endure as long as the stone itself.

Ink for Steel Tools.—Have a rubber stamp made with white letters on a black ground. Make up an ink to use with this stamp, as follows:

Ordinary rosin, ½ pound; lard oil, 1 tablespoonful; lampblack, 2 tablespoonfuls; turpentine, 2 tablespoonfuls. Melt the rosin, and stir in the other ingredients in the order given. When the ink is cold it should look like ordinary printers' ink. Spread a little of this ink over the pad and ink the rubber stamp as usual, and press it on the clean steel—saw blade, for instance. Have a rope of soft putty, and make a border of putty around the stamped design as close up to the lettering as possible, so that no portion of the steel inside the ring of putty is exposed but the lettering. Then pour into the putty ring the etching mixture, composed of 1 ounce of nitric acid, 1 ounce of muri-

atic acid, and 12 ounces of water. Allow it to rest for only a minute, draw off the acid with a glass or rubber syringe, and soak up the last trace of acid with a moist sponge. Take off the putty, and wipe off the design with potash solution first, and then with turpentine, and the job is done.

Writing on Ivory, Glass, etc.—Nitrate of silver, 3 parts; gum arabic, 20 parts; distilled water, 30 parts. Dissolve the gum arabic in two-thirds of the water, and the nitrate of silver in the other third. Mix and add the desired color.

Writing on Zinc (see also Horticultural Inks).—Take 1 part sulphate of copper (copper vitriol), 1 part chloride of potassium, both dissolved in 35 parts water. With this blue liquid, writing or drawing may be done with a common steel pen upon zinc which has been polished bright with emery paper. After the writing is done the plates are put in water and left in it for some time, then taken out and dried. The writing will remain intact as long as the zinc. If the writing or drawing should be brown, 1 part sulphate of iron (green vitriol) is added to the above solution. The chemicals are dissolved in warm water and the latter must be cold before it can be used.

GOLD INK.

I.—The best gold ink is made by rubbing up gold leaf as thoroughly as possible with a little honey. The honey is then washed away with water, and the finely powdered gold leaf left is mixed to the consistency of a writing ink with weak gum water. Everything depends upon the fineness of the gold powder, i. e., upon the diligence with which it has been worked with the honey. Precipitated gold is finer than can be got by any rubbing, but its color is wrong, being dark brown. The above gold ink should be used with a quill pen.

II.—An imitation gold or bronze ink is composed by grinding 1,000 parts of powdered bronze of handsome color with a varnish prepared by boiling together 500 parts of nut oil, 200 parts of garlic, 500 parts of cocoanut oil, 100 parts of Naples yellow, and as much of sienna.

HORTICULTURAL INK.

I.—Chlorate of platinum, ¼ ounce; soft water, 1 pint. Dissolve and preserve it in glass. Used with a clean quill to write on zinc labels. It almost immediately turns black, and cannot be removed by washing. The addition of gum and lampblack, as recommended in certain books, is unnecessary, and even prejudicial to the quality of the ink.

II.—Verdigris and sal ammoniac, of each ½ ounce; levigated lampblack, ½ ounce; common vinegar, ¼ pint; mix thoroughly. Used as the last, for either zinc, iron, or steel.

III.—Blue vitriol, 1 ounce; sal ammoniac, ½ ounce (both in powder); vinegar, ¼ pint; dissolve. A little lampblack or vermilion may be added, but it is not necessary. Use No. I, for iron, tin, or steel plate.

INDELIBLE INKS.

These are also frequently called waterproof, incorrodible, or indestructible inks. They are employed for writing labels on bottles containing strong acids and alkaline solutions. They may be employed with stamps, types or stencil plates, by which greater neatness will be secured than can be obtained with either a brush or pen.

The following is a superior preparation for laundry use:

Aniline oil	85 parts
Potassium chlorate	5 parts
Distilled water	44 parts
Hydrochloric acid, pure (specific gravity, 1.124)	68 parts
Copper chloride, pure	6 parts

Mix the aniline oil, potassium chlorate, and 26 parts of the water and heat in a capacious vessel, on the water bath, at a temperature of from 175° to 195° F., until the chlorate is entirely dissolved, then add one-half of the hydrochloric and continue the heat until the mixture begins to take on a darker color. Dissolve the copper chloride in the residue of the water, add the remaining hydrochloric acid to the solution, and add the whole to the liquid on the water bath, and heat the mixture until it acquires a fine red-violet color. Pour into a flask with a well-fitting ground-glass stopper, close tightly and set aside for several days, or until it ceases to throw down a precipitate. When this is the case, pour off the clear liquid into smaller (one drachm or a drachm and a half) containers.

This ink must be used with a quill pen, and is especially good for linen or cotton fabrics, but does not answer so well for silk or woolen goods. When first used, it appears as a pale red, but on washing with soap or alkalies, or on exposure to

the air, becomes a deep, dead black. The following is a modification of the foregoing:

Blue Indelible Ink.—This ink has the reputation of resisting not only water and oil, but alcohol, oxalic acid, alkalies, the chlorides, etc. It is prepared as follows: Dissolve 4 parts of gum lac in 36 parts of boiling water carrying 2 parts of borax. Filter and set aside. Now dissolve 2 parts of gum arabic in 4 parts of water and add the solution to the filtrate. Finally, after the solution is quite cold, add 2 parts of powdered indigo and dissolve by agitation. Let stand for several hours, then decant, and put in small bottles.

Red Indelible Inks.—By proceeding according to the following formula, an intense purple-red color may be produced on fabrics, which is indelible in the customary sense of the word:

1.—Sodium carbonate..	3 drachms
Gum arabic.....	3 drachms
Water.....	12 drachms
2.—Platinic chloride....	1 drachm
Distilled water.....	2 ounces
3.—Stannous chloride...	1 drachm
Distilled water.....	4 drachms

Moisten the place to be written upon with No. 1 and rub a warm iron over it until dry; then write with No. 2, and, when dry, moisten with No. 3. An intense and beautiful purple-red color is porduced in this way. A very rich purple color—the purple of Cassius—may be produced by substituting a solution of gold chloride for the platinic chloride in the above formula.

Crimson Indelible Ink.—

The following formula makes an indelible crimson ink:

Silver nitrate.....	50 parts
Sodium carbonate, crystal.....	75 parts
Tartaric acid.....	16 parts
Carmine.....	1 part
Ammonia water, strongest.....	288 parts
Sugar, white, crystallized.....	36 parts
Gum arabic, powdered.....	60 parts
Distilled water, quantity sufficient to make.....	400 parts

Dissolve the silver nitrate and the sodium carbonate separately, each in a portion of the distilled water, mix the solutions, collect the precipitate on a filter, wash, and put the washed precipitate, still moist, into a mortar. To this add the tartaric acid, and rub together until effervescence ceases. Now, dissolve the carmine in the ammonia water (which latter should be of specific gravity .882, or contain 34 per cent of ammonia), filter, and add the filtrate to the silver tartrate magma in the mortar. Add the sugar and gum arabic, rub up together, and add gradually, with constant agitation, sufficient distilled water to make 400 parts.

Gold Indelible Ink.—Make two solutions as follows:

1.—Chloride of gold and sodium.....	1 part
Water.....	10 parts
Gum.....	4 parts
2.—Oxalic acid.....	1 part
Water.....	5 parts
Gum.....	2 parts

The cloth or stuff to be written on should be moistened with liquid No. 2. Let dry, and then write upon the prepared place with liquid No. 1, using preferably a quill pen. Pass a hot iron over the mark, pressing heavily.

INDIA, CHINA, OR JAPAN INK.

Ink by these names is based on lampblack, and prepared in various ways. Many makes flow less easily from the pen than other inks, and are less durable than ink that writes paler and afterwards turns black. The ink is usually unfitted for steel pens, but applies well with a brush.

I.—Lampblack (finest) is ground to a paste with very weak liquor of potassa, and this paste is then diffused through water slightly alkalized with potassa, after which it is collected, washed with clean water, and dried; the dry powder is next levigated to a smooth, stiff paste, with a strong filtered decoction of carrageen or Irish moss, or of quince seed, a few drops of essence of musk, and about half as much essence of ambergris being added, by way of perfume, toward the end of the process; the mass is, lastly, molded into cakes, which are ornamented with Chinese characters and devices, as soon as they are dry and hard.

II.—A weak solution of fine gelatin is boiled at a high temperature in a digester for 2 hours, and then in an open vessel for 1 hour more. The liquid is next filtered and evaporated to a proper consistency, either in a steam- or salt-

water bath. It is, lastly, made into a paste, as before, with lampblack which has been previously heated to dull redness in a well-closed crucible. Neither of the above gelatinizes in cold weather, like the ordinary imitations.

To Keep India Ink Liquid.—If one has to work with the ink for some time, a small piece should be dissolved in warm water and the tenth part of glycerine added, which mixes intimately with the ink after shaking for a short time. India ink thus prepared will keep very well in a corked bottle, and if a black jelly should form in the cold, it is quickly dissolved by heating. The ink flows well from the pen and does not wipe.

INK POWDERS AND LOZENGES.

Any of these powders may, by the addition of mucilage of gum arabic, be made into lozenges or buttons—the "ink buttons" or "ink stones" in use abroad and much affected by travelers.

The following makes a good serviceable black ink, on macerating the powder in 100 times its weight of rain or distilled water for a few days:

I.—Powdered gallnuts ..	16 parts
Gum arabic.....	8 parts
Cloves.....	1 part
Iron sulphate.....	10 parts

Put into an earthenware or glass vessel, cover with 100 parts of rain or distilled water, and set aside for 10 days or 2 weeks, giving an occasional shake the first 3 or 4 days. Decant and bottle for use.

The following is ready for use instantly on being dissolved in water:

II.—Aleppo gallnuts	84 parts
Dutch Madder.....	6 parts

Powder, mix, moisten, and pack into the percolator. Extract with hot water, filter, and press out. To the filtrate add 4 parts of iron acetate (or pyroacetate) and 2½ parts of tincture of indigo. Put into the water bath and evaporate to dryness and powder the dry residue.

LITHOGRAPHIC INKS.

These are for writing on lithographic stones or plates:

I.—Mastic (in tears), 8 ounces; shellac, 12 ounces; Venice turpentine, 1 ounce. Melt together, add wax, 1 pound; tallow, 6 ounces. When dissolved, add hard tallow soap (in shavings), 6 ounces; and when the whole is perfectly combined, add lampblack, 4 ounces. Mix well, cool a little and then pour it into molds, or upon a slab, and when cold cut it into square pieces.

II. (Lasteyrie).—Dry tallow soap, mastic (in tears), and common soda (in fine powder), of each, 30 parts; shellac, 150 parts; lampblack, 12 parts. Mix as indicated in Formula I.

MARKING OR LABELING INKS:

Black Marking Inks.—

I.—Borax.....	60 parts
Shellac.....	180 parts
Boiling water.....	1,000 parts
Lampblack,	a sufficient quantity.

Dissolve the borax in the water, add the shellac to the solution and stir until dissolved. Rub up a little lampblack with sufficient of the liquid to form a paste, and add the rest of the solution a little at a time and with constant rubbing. Test, and if not black enough, repeat the operation. To get the best effect—a pure jet-black—the lampblack should be purified and freed from the calcium phosphate always present in the commercial article to the extent, frequently, of 85 to 87 per cent, by treating with hydrochloric acid and washing with water.

II.—An ink that nothing will bleach is made by mixing pyrogallic acid and sulphate of iron in equal parts. Particularly useful for marking labels on bottles containing acids. Varnish the label after the ink is dry so that moisture will not affect it.

COLORED MARKING INKS:

Eosine Red.—

Eosine B.....	1 drachm
Solution of mercuric chloride.....	2 drachms
Mucilage of acacia...	2 drachms
Rectified spirit.....	4 ounces
Oil of lavender.....	1 drop
Distilled water.....	8 ounces

Dissolve the eosine in the solution and 2 ounces of water, add the mucilage, and mix, then the oil dissolved in the spirit, and finally make up.

Orange.—

Aniline orange.....	1 drachm
Sugar.....	2 drachms
Distilled water to....	4 ounces

Blue.—

I.—Resorcin blue.....	1 drachm
Distilled water.....	6 drachms

Mix and agitate occasionally for 2 hours, then add: